decontrol would die out after two years, this analysis does not attempt to measure these effects on the long-term structure of interest rates.

In previous chapters, an accommodative monetary policy was assumed for the NGPA base case and the decontrol options. Thus, as was the case when oil prices were varied in Chapter III, new monetary policy assumptions must be incorporated into these scenarios. Table 17 shows the resulting interest rate changes. The nonaccommodative monetary policy combined with the partial deregulation of gas prices under NGPA in 1985 would cause interest rates to rise five-tenths of a percentage point over those rates in that year under the completely accommodative monetary policy assumed in the previous base. This new NGPA base, therefore, is the point of reference in this chapter. Since complete decontrol in 1984 would cause prices and money demand to increase, a nonaccommodating monetary policy would lead to a 1.1 percentage point increase in interest rates. In 1985, interest rates under complete decontrol would be lower than the original NGPA base case, however, since the inflationary effect of higher gas prices would already be subsiding. Interest rates under partial decontrol with tight money would exhibit a similar pattern except that the changes would not be as large, reflecting the smaller macroeconomic effects of this option.

COMPLETE DECONTROL IN 1984

Table 18 presents the macroeconomic and energy demand effects of complete decontrol in 1984 under the new monetary and fiscal policy assumptions. In general, these alternative policy assumptions would exacerbate the short-term macroeconomic adjustment costs associated with decontrol. For example, the first year reduction in real gross domestic product (GDP) output would be 0.6 percent, rather than the 0.3 percent estimated under the base assumptions used in Chapter II (see Table 3). In addition, the adjustment costs would be prolonged as real GDP declined by 0.5 percent in 1985, primarily because of the lagged effects of higher interest rates on purchases of consumer and producer durable goods. This is in sharp contrast to the slight gain in real domestic output found under complete decontrol using the base assumptions of Chapter II.

While the first year inflationary effects of decontrol would be no different under these new assumptions, they would be somewhat lower in 1985 since lower output growth in 1984 would reduce aggregate demand and, therefore, ameliorate inflation. The reductions in natural gas consumption would be substantially larger than under the base assumptions because the level of economic activity would be lower. In conclusion, a tight monetary policy combined with declining real discretionary spending would increase the macroeconomic adjustment costs of complete decontrol.

TABLE 17. INTEREST RATE CHANGES FOR THREE DECONTROL OPTIONS, ASSUMING A NONACCOMMODATIVE MONETARY POLICY; CHANGES FROM THE ORIGINAL NGPA BASE CASE (By calendar year)

Option	1984	1985	1986a	1987a
NGPA	0.0	0.5	0.0	0.0
Complete Decontrol	1.1	-0.4	0.0	0.0
Partial Decontrol	0.4	-0.3	0.0	0.0

a. The inflationary effects of higher gas prices die out after two years.

TABLE 18. MACROECONOMIC AND ENERGY DEMAND EFFECTS OF COMPLETE NATURAL GAS DECONTROL IN 1984, ASSUMING A NONACCOMMODATIVE MONETARY POLICY AND NO INCREASE IN FEDERAL DISCRETIONARY SPENDING; CHANGES FROM THE NEW NGPA BASE CASE (By calendar year)

Variable	1984	1985	1986	1987
Real Gross Domestic Product GDP (percent change)	-0.6	-0.5	0.2	0.0
Inflation (rate of change) GDP deflator	1.1	-0.5	0.0	0.0
Consumer Price Index	1.0	-0.4	0.0	0.0
Unemployment Rate	0.2	0.1	-0.2	0.0
Natural Gas Consumption (percent change)	-2.5	-2.4	-1.1	-1.2
Oil Imports (percent change)	0.3	-0.1	0.4	0.2

The net budgetary effects of complete decontrol with these new assumptions are presented in Table 19. In the first year under complete decontrol, the deficit would be reduced by $4.6 billion, rather than the $3.6 billion under the base assumptions. In fiscal year 1985, the deficit would increase by nearly $2 billion, as savings in discretionary spending were offset by a greater loss in tax revenues, resulting from decreased economic activity (caused by less government spending and higher interest rates). After 1985, the deficit would be reduced, primarily as a result of faster economic growth as the economy finally adjusted to higher gas prices. The cumulative change in the deficit for fiscal years 1984-1987 would be a reduction of $7.7 billion, $2.7 billion more than the deficit reduction estimated under the base assumptions.

TABLE 19. NET BUDGETARY EFFECTS OF COMPLETE NATURAL GAS DECONTROL IN 1984, ASSUMING A NONACCOMMODATIVE MONETARY POLICY AND GOVERNMENT DISCRETIONARY SPENDING UNADJUSTED FOR INFLATION; CHANGES FROM THE NEW NGPA BASE CASE (By fiscal year, in billions of nominal dollars)

Budget Component	1984	1985	1986	1987
Revenues				
Individual income taxes	2.8	-0.5	3.1	2.9
Corporate income taxes (nonmining)	-0.6	0.4	0.4	0.1
Federal excise taxes	0.1	0.0	0.1	0.1
Social insurance taxes	1.4	0.0	0.6	1.3
Corporate income taxes (mining)	1.1	0.5	0.6	0.6
Total revenues	4.8	0.4	4.8	5.0
Outlays				
Benefit payments for individuals	1.2	2.7	2.8	3.3
Natural gas royalties (offsetting receipts)	-1.0	-0.5	-0.6	-0.6
Total outlays	0.2	2.2	2.2	2.7
Net Budgetary Effect [a]	4.6	-1.8	2.6	2.3

a. Positive numbers indicate a reduction in the deficit; negative numbers indicate an increase.

PARTIAL DECONTROL IN 1984

The effects of partial decontrol on prices, output and energy demand are presented in Table 20. Again, the output losses during 1984 and 1985 would be larger than those found under the base assumptions. As with these assumptions, however, output gains in the out years would offset the short-term losses. While natural gas consumption would be 1.0 and 0.5 percent lower in 1984 and 1985, respectively, they would increase slightly in 1986 as economic growth moved upward. In conclusion, since partial decontrol would involve relatively small increases in gas prices, its effects seem to be immune to any deleterious effects emanating from restrictive monetary or fiscal policies.

The budgetary effects of partial decontrol appear in Table 21. The fiscal year 1984 reduction in the deficit under the base assumptions was $1.1 billion (see Table 6), whereas the reduction would be $1.4 billion under the new assumptions. The deficit would not be changed in 1985, but deficit

TABLE 20. MACROECONOMIC AND ENERGY DEMAND EFFECTS OF COMPLETE NATURAL GAS DECONTROL IN 1984, ASSUMING A NONACCOMMODATIVE MONETARY POLICY AND FEDERAL DISCRETIONARY SPENDING UNADJUSTED FOR INFLATION; CHANGES FROM THE NEW NGPA BASE CASE (By calendar year)

Variable	1984	1985	1986	1987
Real Gross Domestic Product (percent change)	-0.2	-0.1	0.3	0.1
Inflation (rate of change)				
GDP deflator	0.4	-0.4	0.0	0.0
Consumer Price Index	0.3	-0.4	0.0	0.0
Unemployment Rate	0.1	0.0	-0.1	0.0
Natural Gas Consumption (percent change)	-1.0	-0.5	0.1	0.0
Oil Imports (percent change)	0.2	0.1	0.5	0.2

reductions in the out years would yield a cumulative net deficit reduction of roughly $3.7 billion over fiscal years 1984-1987. The magnitude of these numbers indicates that the net budgetary consequences of partial and complete decontrol are insignificant, particularly in light of larger projected deficits for fiscal years 1984 and 1985.

TABLE 21. NET BUDGETARY EFFECTS OF PARTIAL NATURAL GAS DECONTROL IN 1984, ASSUMING A NONACCOMMODATIVE MONETARY POLICY AND FEDERAL DISCRETIONARY SPENDING UNADJUSTED FOR INFLATION; CHANGES FROM THE NEW NGPA BASE CASE (By fiscal year, in billions of nominal dollars)

Budget Component	1984	1985	1986	1987
Revenues				
Individual income taxes	0.9	-0.7	1.4	0.6
Corporate income taxes (nonmining)	-0.2	0.4	0.3	0.0
Federal excise taxes	0.0	0.0	0.1	0.0
Social insurance taxes	0.5	-0.4	0.2	0.4
Corporate income taxes (mining)	0.3	0.0	0.0	0.0
Total revenues	1.5	-0.7	2.0	1.0
Outlays				
Benefit payments for individuals	0.4	0.7	0.3	0.4
Natural gas royalties				
(offsetting receipts)	-0.3	0.0	0.0	0.0
Total outlays	0.1	0.7	0.3	0.4
Net Budgetary Effect [a]	1.4	0.0	1.7	0.6

a. Positive numbers indicate a reduction in the deficit.

APPENDIXES

The budgetary effects of natural gas decontrol primarily depend on the resulting level of natural gas prices. The economy's response to higher gas prices under decontrol ultimately changes budget revenues and outlays. Thus, the first step in estimating the budgtary implications of higher gas prices is to understand the process by which the gas market would reach a new price level upon decontrol. This process involves a sequence of transactions between natural gas producers, pipelines, utilities, and final users that are governed by a variety of contract provisions not commonly found in other markets. These transactions and contract provisions are affected both directly and indirectly by federal and state natural gas regulatory policies. Consequently, this appendix provides background information on the regulatory history of the natural gas market, the Natural Gas Policy Act of 1978 and producer/purchaser contracts.

THE EVOLUTION OF NATURAL GAS POLICY

Natural gas regulation was established with the enactment of the Natural Gas Act of 1938 (NGA). Judicial interpretation of the NGA determined the format of subsequent federal gas regulation and the types of problems that would eventually arise under it. Knowledge of the history of federal regulation under NGA is, therefore, a necessary first step in understanding current natural gas policy issues.

The Natural Gas Act of 1938

The justification for federal intervention in the natural gas market was based on a series of Federal Trade Commission (FTC) reports that documented numerous abuses, including monopoly control over prices by pipelines in the gas market. As a result, the FTC recommended federal regulation of interstate natural gas prices. Natural gas bills were introduced in the Congress each year from 1935 to 1937, generally as proposals to regulate interstate pipelines in the same fashion as electric utilties. A bill was finally approved by the Congress and signed into law by President Roosevelt as the Natural Gas Act of 1938.

The NGA was designed to deal with pipeline monopoly in order to protect consumer interests. The act introduced the use of price ceilings for the resale of interstate gas from pipelines to consumers. These prices were calculated according to the traditional public utility method, in which prices were set to cover actual costs plus a reasonable rate of return and depreciation.

Federal Regulation Under the NGA

The Federal Power Commission (FPC), which administered the NGA, first focused its attention on the regulation of pipelines. The scope of NGA, however, was expanded in 1954 with the Supreme Court's decision in Phillips versus Wisconsin. The Court interpreted the NGA as requiring the FPC to regulate rates charged by natural gas producers and pipelines in the sale of interstate gas. Thus, the FPC was given the authority to regulate natural gas producers' wellhead prices.

Initially, the FPC attempted to set wellhead prices for producers on an individual basis. This procedure required the commission to study the rate base and operating costs of each producer in order to calculate individual cost-based prices and led to a huge backlog of cases. As a result, the FPC set producer prices for entire geographic regions based on regional average production costs and allowed rates of return. The Supreme Court upheld the concept of area-wide pricing in the Permian Basin Area Rate Case of 1968.

Recognizing a growing imbalance between natural gas supply and demand, the FPC attempted to increase price incentives for gas production. In 1974, it set a national price for gas from wells drilled on or after January 1, 1973. In addition to allowing a higher price, the FPC included an annual price escalator and excluded certain state and federal taxes and allowances from the calculation of wellhead prices.

The FPC also recognized that the interstate-intrastate market distinction had become a problem. The regulated interstate market price did not provide adequate incentive to draw supplies from the unregulated intrastate market in which prices were higher. Furthermore, interstate demand remained artificially high because the price of new, high-cost gas was averaged with old gas prices. Thus, the average price paid by consumers did not reflect the full marginal cost of new gas supplies. This disparity between intrastate and interstate demand led to gas shortages in the interstate markets during the middle 1970s. This, in turn, led the Congress to reconsider natural gas policy.

The Natural Gas Policy Act of 1978

The Natural Gas Policy Act (NGPA) of 1978 was intended to provide incentives for new production through higher prices while preventing sharp price increases for gas already in production. Consequently, the act combined deregulation and price controls by allowing phased deregulation of certain categories of newly discovered gas and by creating nationwide price ceilings for all other gas. Also, the Federal Energy Regulatory Commission (FERC) was established to replace the Federal Power Commission.

An overview of NGPA is presented in Table A-1. As the table illustrates, the sections of NGPA can be classified into three major categories: supply incentives, consumer protection, and regulation of intrastate gas prices.

The supply incentive sections were designed to increase the nation's gas supply at the margin by allowing price increases that were rapid by historical standards and eventual deregulation. Section 102 includes gas found outside 2.5 miles of an existing well or gas found 1,000 feet below the completion depth of that well. In addition, Section 102 includes gas from outer continental shelf leases and production from new reservoirs. The price ceilings for these categories are allowed to increase at the rate of inflation plus a real growth premium. New onshore gas produced within existing fields is included in Section 103; its price increases at only the inflation rate. High-cost gas (Section 107--that is, gas that is costly to produce) includes gas from wells drilled below 15,000 feet, and gas produced from geopressurized brine, coal seams, devonian shales, and other high-cost sources. With the exception of gas produced from low-production wells (stripper wells), each of the supply incentive categories would be deregulated on January 1, 1985.

The NGPA was also designed to protect consumer interests through continued regulation of most gas already in production. Hence, the second major category of gas under NGPA includes old, low-cost natural gas. Section 104 sets the ceiling price for natural gas already dedicated to interstate commerce. The maximum lawful price in contracts that are renegotiated is determined by the provisions set forth in Section 106 of NGPA. The Section 106a price is the higher of either the price in the expiring contract or $0.54 per milion Btus, both escalating at the annual rate of inflation. Section 109 is a catch-all category. Each of these categories would not be deregulated in 1985.

The last major part of NGPA addressed the disparities between intrastate and interstate gas prices by imposing price controls on intrastate gas. For Section 105 gas, the price ceilings are tied to new gas prices

TABLE A-1. OVERVIEW OF THE NATURAL GAS POLICY ACT OF 1978

Sections	Description	Price Escalation Formula	Status as of 1/1/85
Supply Incentives			
102	New natural gas outside existing fields; new reservoirs; new outer continental shelf fields	Inflation plus real growth premium	Deregulated
103	New onshore wells within existing fields	Inflation	Deregulated
107	High-cost gas	Deregulated immediately	Deregulated
108	Stripper wells	Same as 102	Regulated
Consumer Protection			
104	Interstate gas	Same as 103	Regulated
106a	Renegotiated interstate contracts	Same as 103	Regulated
109	All other gas	Same as 103	Regulated
Intrastate Market			
105	Intrastate gas	Tied to new gas prices	Deregulated
106b	Renegotiated intrastate contracts	Same as 103	Deregulated if contract price is greater than $1.00 per thousand cubic feet

(Section 102). Section 106b includes provisions for setting renegotiated intrastate prices that closely follow the methods employed in Section 106a. Some intrastate gas categories would be deregulated in 1985.

AN OVERVIEW OF CONTRACT PROVISIONS

This section provides additional information on contracts between gas producers and purchasers. The delivery of natural gas from the producer to the final user involves a large and complex network of pipelines. Each step of this process has been regulated by both federal and state regulatory authorities. In fact, under most suggested wellhead decontrol policies, including those considered in this study, the regulatory apparatus for the transmission and distribution of gas would remain in place. Therefore, the adaptability of these regulations and their influence on contract provisions, particularly those affecting producer-pipeline transactions, would be an important consideration in developing a policy to decontrol natural gas.

Contract Provisions

The sales contracts between producers and purchasers generally include four major components: duration, take-or-pay provisions, pricing provisions, and buyer-protection clauses. The following sections explain the nature of each of these provisions and present estimates of their prevalence in the natural gas market.

Contract Duration. Long-term contracts are often arranged in order to guarantee continued service and to justify capital investments in either gas turbines or pipelines. Contracts in the interstate market were historically written for 20 years or more. Long-term contracts also exist in the major intrastate markets, such as Texas and Louisiana. Recent contracts are for shorter time periods, reflecting producers' fears of being locked into fixed prices during inflationary periods. Thus, while the gas market is beginning to acquire more flexibility, the existence of long-term contracts will delay the adjustment of the gas market to new gas pricing policies.

Take-or-Pay Provisions. Take-or-pay provisions require the buyer to pay for certain quantities of gas at preset prices regardless of whether delivery occurs at the time of payment. The financial uncertainty associated with gas production is a major motivation for this provision. Because of the large cash investments required to drill and develop a well, producers often need payment for large amounts of gas during the first few years of a contract. These requirements lead producers to seek an assured market for their gas, though contracts tied to the production from a specific well or a

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particular field. Take-or-pay provisions are also sought by producers for protection against situations in which pipelines or other buyers could exert a disproportionate influence on prices and quantities sold once gathering equipment is in place.

Take-or-pay provisions may discourage buyers from minimizing the cost of gas. For example, a distribution company or pipeline may be forced to buy gas at a high price under a contract with a high take-or-pay provision and subsequently refuse cheaper gas or gas with a lower take-or-pay provision from another source. This phenomenon is partly attributable to the fact that profits by distribution and pipeline companies are regulated and, therefore, not influenced by any competitive bidding for gas supplies. Profits may be influenced, however, by any load loss. This problem is exacerbated since distribution companies purchase gas from pipelines at a single rate that is an average of old, low-cost gas and new, high-cost gas. Thus, this average cost pricing reduces the marketing risk associated with the purchase of high-cost gas to the extent that large volumes of low-cost gas are available.

Pricing Provisions. The pricing clauses in natural gas contracts are complex. There are three basic varieties of pricing provisions: definite escalation, highest allowed regulated-rate, and deregulation provisions. Definite escalation clauses set the price according to a fixed rate of growth or to a schedule of price increases in nominal or real dollars.

The latter two provisions set prices according to future external events, and are called indefinite escalator clauses. The highest allowed regulated-rate provision allows the producer the highest rate set by federal and state price regulations. Determining the overall price adjustments stemming from contracts that have this provision is difficult because of the uncertainty of regulatory actions. In addition, existing contracts reflect past responses to and expectations of federal and state regulation. For example, area rate clauses for both intrastate and interstate gas appeared after the adoption of area-wide, cost-based price regulation. The regulations changed again in 1974 when the Federal Power Commission adopted nationwide regulation. As a result of this change, and with the myriad of price ceilings under NGPA, the highest allowed regulated-rate provisions were written in even more general terms. Many recent contracts set prices according to the highest price allowed under current law.

Deregulation provisions are included in contracts to determine the price of gas when it is deregulated and to set the price of gas not currently regulated (such as high-cost gas under Section 107 of the NGPA). Ever since the Phillips decision in 1954, deregulation has been anticipated. Therefore, deregulation clauses were added to contracts. The most common deregulation provision sets the contract price at an average of the two or three

highest prices being paid in a producing area. The price may also be the highest paid by the purchaser for similar gas sold under another contract. These options are called "most-favored-nation" clauses. Producers with contracts containing these clauses would receive preferential treatment upon deregulation over other producers who do not have such contracts.

Many recent contracts have several pricing options in the event of deregulation. Besides the most-favored-nation clauses, natural gas prices have been tied to the price of oil, usually that of crude oil or No. 2 fuel oil (distillate oil). Pricing clauses may also be based on a fixed percentage rate of increase. When more than one pricing option appears in a contract, the seller is usually allowed to choose the price. Another form of seller protection provided in some recent contracts is the minimum-price provision that prevents the price from falling below its previous level. The combination of this provision and the most-favored-nation clauses could lead to a situation in which prices could increase sharply yet could not easily be adjusted downward in response to market forces.

Buyer Protection Provisions. While some price provisions favor high gas prices, buyer-protection clauses introduce some flexibility into the marketing of natural gas. The "market-out" and "if-disallowed" provisions are two major types of buyer-protection clauses. A market-out provision allows the buyer to refuse delivery if the gas is determined to be unmarketable at the renegotiated price. In many contracts, the conditions for determining marketability are not clearly defined. Some contracts, however, leave the determination of marketability to the discretion of the buyer. The if-disallowed provision would not allow a new price to be passed through to the buyer if the FERC or a state public utility commission determined that the price was unjustified.

Effects of Contract Provisions on Gas Supplies

This section presents estimates of the relative importance of various contract provisions on total natural gas supplies. Several surveys of existing contract provisions have recently been conducted to estimate the magnitude of the "fly-up" problem--that is, the possibility that wellhead natural gas prices will increase sharply upon decontrol and not fall in response to market forces because of rigid contract provisions.[1] The key data requirement is the amount of gas associated with each type of contract provision.

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1.   The data presented in this section are from U.S. Department of Energy, Energy Information Administration, Office of Oil and Gas, Natural Gas Producer/Purchaser Contracts and Their Potential Impacts on the Natural Gas Market (June 1982).

For example, there may be a large percentage of contracts with deregulation provisions that have most-favored-nation clauses; yet if these contracts cover only a small faction of total gas supplies, then the fly-up problem may not occur.

The prevalence of take-or-pay provisions and buyer-protection clauses is also important. For instance, if contracts with maximum-price provisions also include market-out clauses, then there would be a greater possibility that prices could fall in response to market forces. On the other hand, widespread use of take-or-pay provisions would have the opposite effect. Another important aspect is contract age. Contracts signed after passage of the NGPA have different provisions. In addition, contracts governing interstate and intrastate gas also vary because of fundamental differences in the two markets and in their regulatory histories. These distinctions imply that the following discussion can best be divided into contract provisions for old interstate gas (NGPA Sections 104 and 106a), old intrastate gas (Sections 105 and 106b), and post-NGPA gas (Sections 102, 103, 107 and 108).

Old Interstate Gas. In 1980, the volume of interstate gas under contracts signed before enactment of the NGPA was estimated to be 6.18 trillion cubic feet (approximately 31 percent of total U.S. demand), with an average wellhead price of $0.89 per thousand cubic feet. About 8 percent of this amount is governed by contracts with definite price escalators, 26 percent is covered by highest allowed regulated rate clauses, and 66 percent has deregulation provisions. Roughly 92 percent of old interstate gas supplies have take-or-pay provisions. Only 6 percent have market-out clauses, and 14 percent have renegotiated prices that can be disallowed by FERC. For the contract volumes covered by deregulation clauses, 90 percent have most-favored-nation clauses that link the price to an average of the highest priced gas in specific producing areas. Thus, based on this information, there appears to be little downward flexibility in prices for old interstate gas.

Old Intrastate Gas. The volume of old intrastate gas (Sections 105 and 106b) has been estimated at 6.23 trillion cubic feet in 1980 (approximately 32 percent of U.S. demand). The average wellhead price for this gas in 1980 was about $1.17 per thousand cubic feet. On January 1, 1985, only Section 105 gas with a price that exceeds $1.00 per million Btus would be deregulated. Rollover contracts for intrastate gas (that is, contracts that expire and are extended) are included in Section 106b. Natural gas produced under Section 106b would be deregulated in 1985 if the price exceeds $1.00 per million Btus. Roughly 28 percent of the gas volumes under Section 105 will roll over between now and 1985.

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It is estimated that 34 percent of intrastate gas under Sections 105 and 106b will be deregulated in 1985. Of this amount, 51 percent have only definite price escalator provisions. This is in sharp contrast to the 8 percent figure for old interstate gas and may reflect the fact that three-fourths of Section 105 gas is delivered under contracts signed before 1973. In addition, direct sales to final users, primarily large industrial customers, take a much larger proportion of intrastate sales. The large share of definite price escalator clauses may have been used to attract these customers. Twenty-two percent of the old intrastate gas supplies slated for decontrol in 1985 has most-favored-nation clauses. Close to 76 percent has take-or-pay provisions. Thus, prices for old intrastate gas may not increase as sharply as those for old interstate gas.

Post-NGPA Gas. Some overlap exists between contracts signed before and after the Natural Gas Policy Act of 1978. For instance, some long-term contracts have been amended to add additional wells. Consequently, a contract negotiated before enactment of the NGPA can apply to a well drilled after 1978. Recognizing this possible double counting problem, the 1980 volume of post-NGPA gas has been estimated at 6.23 trillion cubic feet (approximately 33 percent of total demand). The 1980 wellhead price for this gas was $2.19 per thousand cubic feet, considerably higher than prices for the two previously mentioned categories.

Deregulation clauses cover 59 percent of post-NGPA gas. Of these contract quantities, 76 percent have most-favored-nation clauses, 21 percent have market-out clauses, and 21 percent have oil parity price provisions. Roughly 80 percent of post-NGPA gas volumes are associated with contracts that have take-or-pay provisions. The price of post-NGPA gas, therefore, will quickly reflect any change in gas pricing policy.

APPENDIX B.   MEASURING THE MACROECONOMIC AND BUDGETARY ADJUSTMENTS TO GAS PRICES

This appendix presents a brief overview of the major economic mechanisms governing the adjustment of the economy and the budget to higher gas prices. Four mechanisms related to interactions between the economy and energy market are discussed:

o   Shifts in the composition of consumer spending in response to relative price changes and reductions in discretionary income resulting from higher gas prices;

o   Substitutions among inputs used in the production of nonenergy goods and services (such as labor demand and the demand for fuels);

o   Energy producer investments in equipment and structures in response to higher energy revenues; and

o   Inflationary implications of higher energy prices given the above three mechanisms and current wage and price flexibility.

The major elements involved in the calculation of federal revenues and outlays are also discussed.

ADJUSTMENTS IN CONSUMER SPENDING

The allocation of total consumer spending would be affected by an increase in real natural gas prices. Given the historically observed inelastic nature of short-run energy demand, a rapid rise in natural gas prices would increase the share of energy expenditures in total consumer outlays. Since it is unlikely that household income would increase as rapidly as these expenditures, either savings or consumption of other goods and services would decline in the short run.

These shifts in the composition of consumption would affect employment and output. A reduction in consumption of other goods and services caused by higher energy prices would translate into lower receipts, output, and employment for various sectors of the economy.

ADJUSTMENTS IN PRODUCTION

Nonenergy producers purchase fuels from energy producers, hire workers, and invest in capital to produce goods for final consumption or for inputs into another production process. The payments for these factors of production become household wage and capital income and energy producer revenues. Nonenergy producers would play an important role in the adjustment of the economy to higher gas prices.

The production response to higher gas prices is a combination of substitution effects and the rate at which output is adjusted in response to demand effects stemming from changes in the composition of consumer spending. Substitution effects embody "own-price" and "cross-price" effects. The former is the simple law of demand--less of any good or input is typically demanded as its price rises. Cross-price effects reflect the substitutability and complementarity among factors of production. For example, if natural gas and labor are substitutes, then the quantity of labor demanded would increase with a rise in natural gas prices. On the other hand, if they are complements, the quantity of labor demanded would decline with an increase in the price of natural gas. These relationships would determine changes in labor and capital income in response to higher gas prices.

ENERGY PRODUCERS

The consumption and investment behavior of energy producers would be pivotal in the economic adjustments set in motion by decontrol. If natural gas producers received prices in excess of the costs of production, they would reap profits. These profits might be invested or distributed through dividends. Thus, as these profits resulted in higher income for households, they would offset the changes in consumer spending. For example, increased exploration, development, and production would increase employment in the energy industry. This employment stimulus and its associated impact on wage income would partially offset employment declines elsewhere in the economy and, as a result, stimulate growth in personal income.

This study assumes that natural gas production is determined by the quantity of natural gas demanded by households, commerce, and industry. Therefore, higher revenues for natural gas producers would stimulate their investment spending, but would not significantly affect the amount of gas actually produced. Higher natural gas prices would stimulate additions to proven reserves. The net effect on reserves, however, would be small since additions to natural gas reserves would probably not exceed current production. In addition, even if there were large increases in proven reserves

through enhanced recovery and more exploration, a corresponding increase in actual production might not occur. Producers might simply cap wells and wait for higher prices, especially if expectations were formed on the basis of declining domestic reserves and higher prices for marginal supplies, such as Canadian gas and liquified natural gas from Algeria.

PRICE AND WAGE FLEXIBILITY

The degree of price and wage flexibility under various natural gas policies would influence real income and output in the economy. The response of wages and prices to higher natural gas prices would probably be similar to the one associated with higher oil prices. An increasing share of natural gas expenditures in total consumer purchases and production costs would cause future natural gas price increases to have successively larger effects on the general price level. The current sensitivity of the general price level to oil prices is a case in point. One mitigating factor to this process of "price-ratcheting" is the demand response. In other words, if the reduction in natural gas demand caused by higher prices was large enough, its share in total costs might decline over time and, thus, offset the price-ratcheting effect.

The total impact of higher natural gas prices on the level of wages and prices is composed of direct and indirect effects. First, higher gas prices would directly increase the Consumer Price Index (CPI) and also increase producer prices. If nonenergy producers and households conducted economic transactions in a competitive environment with flexible prices, then higher natural gas prices might not substantially raise the price level. On the other hand, if most producers engaged in cost-markup pricing, then higher natural gas costs would be passed on to the next stage of production. The result would be higher producer prices. These higher prices would indirectly increase the CPI. A higher CPI would lead to somewhat larger wage and salary increases that would, in turn, add to production costs.

LINKS TO THE FEDERAL BUDGET

The budgetary implications of various natural gas policies are directly related to macroeconomic adjustments. Since tax revenues are extremely sensitive to changes in economic activity, special consideration is given in this report to the calculation of tax revenues in order to measure the unique changes that energy prices have on the economy and the tax base. Changes in federal outlays are not as directly intertwined with economic activity and, as a result, can be estimated based on budgetary rules of thumb.

Revenues

Various natural gas prices change personal income tax payments, corporate taxes, social insurance taxes, royalties, and other excise taxes. In this analysis, estimates of personal income tax payments are based on a set of equations that explicitly models individual income tax liabilities based on variations in the nominal/real composition of aggregate income. [1] In other words, the model estimates the impacts of new returns as well as the effects of increases in taxable income per return that are associated with inflation or real growth. This technique is most valuable for this analysis since higher energy prices tend to increase inflation and reduce employment simultaneously in the short term. This procedure also considers how aggregate taxable income is spread over the structure of tax brackets. Thus, the increase in tax revenues caused by bracket creep can be measured. The use of traditional tax models would tend to underestimate the increase in tax revenues from bracket creep.

Changes in corporate profits and excise taxes are linked to the production side of the econometric model. Higher energy prices promote a different mix of labor and capital used by nonenergy producers and, as a result, influence corporate income. Thus, changes in corporate tax payments in response to higher energy prices primarily depend on substitution possibilities among fuels and other inputs used in the production of goods and services. Corporate taxes paid by the mining sector are primarily dependent on fuel prices and the level of energy demand.

Social insurance tax payments (for example, Social Security and unemployment compensation) are also computed in the model, based on total wage and salary income in relation to the maximum contribution limit and on the unemployment rate. These payments would increase from purely nominal growth in wages and salaries caused by inflation and from increases in unemployment filings, both resulting from higher gas prices.

Finally, royalty payments by natural gas producers would also increase under decontrol since these payments are based on a percentage of wellhead receipts. Production from offshore wells is the major source of federal natural gas royalty receipts. Roughly 24 percent of all gas is produced from offshore federal lands and is taxed at a rate of 16 and two-thirds percent. Production from onshore wells on federal lands is approximately 5 and one-half percent of total production and is taxed at a 14 percent rate. About 50 percent of total onshore royalties accrue to state governments.

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1. Congressional Budget Office, Modeling the Indexed Income Tax (March 1982).

Outlays

The response of federal outlays to natural gas decontrol would depend on the resulting inflation and unemployment rates. Changes in federal purchases of goods and services induced by gas policy are based on the rate of change in the gross domestic product price deflator. The remaining change in government outlays includes changes in unemployment compensation; programs automatically indexed to the Consumer Price Index, such as Social Security; and indirectly indexed programs, such as Medicare.

A budgetary rule-of-thumb procedure is used to calculate outlays in this report because the econometric approach adopted for the other parts of the analysis does not adequately portray the program-specific timing of outlays on federal grants and transfers. For example, Social Security benefits are adjusted every July, based on the most recent first-quarter-to-first-quarter increase in the CPI. On the other hand, federal retirement benefits are adjusted in the spring based on the December-over-December CPI increase. In addition, some outlays tend to respond to changes in the inflation rate even though they are not explicitly indexed. Medicare and Medicaid are two such programs. Unemployment insurance benefits also increase with inflation since wage rates increase. Given these complications, a set of program-specific multipliers were used to calculate the change in federal grants and benefit payments to individuals for percentage changes in the unemployment rate and the CPI.

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